

Detecting Slow Deformation Signals Preceding Dynamic Failure: A New Strategy For The Mitigation Of Natural Hazards (SAFER)

*Original*

Detecting Slow Deformation Signals Preceding Dynamic Failure: A New Strategy For The Mitigation Of Natural Hazards (SAFER) / Vinciguerra, Sergio; Colombero, Chiara; Comina, Cesare; Maria Ferrero, Anna; Mandrone, Giuseppe; Umili, Gessica; Fiaschi, Andrea; Saccorotti, Gilberto. - In: GEOPHYSICAL RESEARCH ABSTRACTS. - ISSN 1607-7962. - 16:(2014), pp. EGU2014-16848-EGU2014-16848. (Intervento presentato al convegno EGU General Assembly 2014 tenutosi a Vienna, Austria nel 27 April - 2 May 2014).

*Availability:*

This version is available at: 11583/2746432 since: 2019-08-06T16:10:57Z

*Publisher:*

EGU

*Published*

DOI:

*Terms of use:*

openAccess

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

*Publisher copyright*

(Article begins on next page)



## **Detecting Slow Deformation Signals Preceding Dynamic Failure: A New Strategy For The Mitigation Of Natural Hazards (SAFER)**

Sergio Vinciguerra (1,2,3), Chiara Colombero (3), Cesare Comina (3), Anna Maria Ferrero (3), Giuseppe Mandrone (3), Gessica Umili (4), Andrea Fiaschi (5), and Gilberto Saccorotti (6)

(1) Department of Geology, University of Leicester, United Kingdom, (2) British Geological Survey, Keyworth, United Kingdom, (3) Dipartimento di Scienze della Terra, Università di Torino, Italy, (4) Dipartimento di Ingegneria Civile, Università di Parma, Italy, (5) Fondazione Prato Ricerche, Prato, Italy, (6) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Pisa, Italy

Rock slope monitoring is a major aim in territorial risk assessment and mitigation. The high velocity that usually characterizes the failure phase of rock instabilities makes the traditional instruments based on slope deformation measurements not applicable for early warning systems. On the other hand the use of acoustic emission records has been often a good tool in underground mining for slope monitoring. Here we aim to identify the characteristic signs of impending failure, by deploying a “site specific” microseismic monitoring system on an unstable patch of the Madonna del Sasso landslide on the Italian Western Alps designed to monitor subtle changes of the mechanical properties of the medium and installed as close as possible to the source region.

The initial characterization based on geomechanical and geophysical tests allowed to understand the instability mechanism and to design the monitoring systems to be placed. Stability analysis showed that the stability of the slope is due to rock bridges. Their failure progress can results in a global slope failure. Consequently the rock bridges potentially generating dynamic ruptures need to be monitored. A first array consisting of instruments provided by University of Turin, has been deployed on October 2013, consisting of 4 triaxial 4.5 Hz seismometers connected to a 12 channel data logger arranged in a ‘large aperture’ configuration which encompasses the entire unstable rock mass. Preliminary data indicate the occurrence of microseismic swarms with different spectral contents.

Two additional geophones and 4 triaxial piezoelectric accelerometers able to operate at frequencies up to 23 KHz will be installed during summer 2014. This will allow us to develop a network capable of recording events with  $M_w < 0.5$  and frequencies between 700 Hz and 20 kHz.

Rock physical and mechanical characterization along with rock deformation laboratory experiments during which the evolution of related physical parameters under simulated conditions of stress and fluid content will be also studied and theoretical modelling will allow to come up with a full hazard assessment and test new methodologies for a much wider scale of applications within EU.